Optimization of Electrochemiluminescence Experimental Conditions for Metoclopramide Determination Based on Response Surface Methodology

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Based on the strong enhancement effect of metoclopramide on the electrochemiluminescence signal of Ru(bpy)₃²⁺ on the platinum electrode, a novel method for the sensitive detection of metoclopramide was established. Based on the single factor experiments, the interactions among the three factors were investigated by response surface methodology. Finally, the optimal experimental conditions for the determination of metoclopramide in a limited number of experiments are: detection potential 1.18 V, phosphate buffer solution concentration 39.82 mmol/L and pH 7.69. These conditions can improve the sensitivity of the method by 4.5%, which is very important for the determination of trace components. The detection limit (3σ) of the method was 4.0×10^{-3} mg/L, the linear range was 0.02—36.56 mg/L, the correlation coefficient was 0.9991, and the recoveries were 97.3%—102.4%. This method is simple, rapid, sensitive and with less injection.

Keywords: Electrochemiluminescence; Metoclopramide; Response surface methodology; Optimization

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